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range of subject matter. They indicate that the work now being done by the university is thoroughly specialized, and is organized on the broadest possible basis. The number of contributors is larger than in any previous year, and includes authors of a wide range of training and interest. In total bulk, the contributions of the period just passed (782 pages, 38 plates, 235 text figures and 3 maps) are larger than ever before in the history of anthropological work in California.

THOMAS WATERMAN

BOTANICAL NOTES

ANOTHER KEY TO SACCARDO

A COUPLE of years ago a brief notice was made in SCIENCE of a typewritten English key to Saccardo's "*Sylloge Fungorum*" prepared for the use of the mycological students in the University of Nebraska, and the statement was made that a few extra copies might be obtained on application. The results of the announcement were surprising. At once requests for the key came from all parts of the country, and within a week the small stock of the books was all sold out, and it became evident that a reissue or a new edition must be prepared. This has now been done by Professor Dr. Clements, of the University of Minnesota, and proof is now being read upon the new edition, which is to be printed and brought out as a small book. It will contain keys to "spore sections," to orders and families, and to the genera, besides some handy indexes, glossaries, etc. As it has been announced to be "ready by September 20" further notice may be deferred until the appearance of the completed work. In the meantime those who are especially interested in it may communicate with the author, as above, at Minneapolis.

A NEW COLORADO BOOK

PROFESSOR RAMALEY, of the University of Colorado, has given us in his "*Wild Flowers and Trees of Colorado*" a charming little book intended to serve as an introduction to Colorado plants. In less than a hundred pages he leads the beginner far on the road to

a knowledge of the vegetation of this state. He first discusses the general aspects of Colorado vegetation (ecology we often have called it in these later years) and then takes up the forests and forest trees of the state. He recognizes five zones or belts of vegetation, namely, the plains zone, foothill zone, montane zone, sub-alpine zone and alpine zone. These are admirably illustrated by many half-tone reproductions of well-selected photographs. The forest trees are briefly described by means of convenient keys, and the text is helped greatly by many illustrations. A bibliography including thirty-one titles completes this very useful book.

THE MINNESOTA BOTANICAL STUDIES

THE resumption of publication of the widely-known "*Minnesota Botanical Studies*" is a matter of more than ordinary interest to botanists. The "*Studies*" were begun fifteen years ago by Professor MacMillan, under whom two fine volumes were completed, and parts 1, 2 and 3 of the third volume were issued, publication ceasing five years ago. Now under Professor Clements, part 1 of volume IV. makes its appearance with the same style of cover, paper and typography. In the present part, which covers 132 pages, there are six papers, viz: "*Embryo-sac Development and Embryology of *Symplocarpus foetidus**," by C. O. Rosendahl; "*The Seeds and Seedlings of *Caulophyllum thalictroides**," by F. K. Butters; "*Influence of Physical Factors on Transpiration*," by A. W. Sampson and L. M. Allen; "*Two Basidiomycetes New to Minnesota*" and "*The Pezizales, Phacidiales and Tuberales of Minnesota*," by D. S. Hone; "*A New Genus of Blue-green Algae*," by F. E. Clements and H. L. Shantz. The promise is made, also, that an index and title page "will be furnished at an early date" for the three preceding parts which are to constitute volume III.

RECENT SYSTEMATIC PAPERS

WE may briefly notice the following contributions from the United States National Herbarium: Henry Pittier's "*New or Note-*

worthy Plants from Colombia and Central America" (XII., 5), with two plates and nine text figures; A. S. Hitchcock's "Grasses of Cuba" (XII., 6); J. N. Rose's "Studies of Mexican and Central American Plants—No. 6" (XII., 7); with eight plates and twenty-nine text figures; Paul C. Standley's "Allionaceae of the United States, with Notes on Mexican Species" (XII., 8) with sixteen plates and nineteen text figures; Britton and Rose's paper on "*Thompsonella*," "*Echeveria*" and "New Species of Crassulaceae" (XII., 9) with five plates; Britton and Rose's "Genus *Cereus* and its Allies in North America" (XII., 10), with sixteen plates; J. N. Rose's "Five New Species of Crassulaceae from Mexico" (XII., 10), with five plates; Coulter and Rose's "Supplement to the Monograph of the North American Umbelliferae" (XII., 10), with two plates; and G. N. Collins's "Apogamy in the Maize Plant" (XII., 10), with two plates showing the replacement of the staminate flowers by young leafy, and root-forming maize plants; and Wm. R. Maxon's "Studies of Tropical American Ferns—No. 2" (XIII., 1), with nine plates and one text figure, and including descriptions of many new species.

Much botanical activity is shown by the two recently issued "Contributions from the Gray Herbarium of Harvard University" (XXXVI. and XXXVII.), in the first of which there are papers by Alice Eastwood ("Synopsis of the Mexican and Central American Species of *Castilleja*" and "Some Undescribed Species of Mexican Phanerogams"); B. L. Robinson ("A Revision of the Genus *Rumfordia*," "Diagnoses and Transfers of Tropical American Phanerogams"); and H. H. Bartlett ("A Synopsis of the American Species of *Litsea*," "Notes on Mexican and Central American Alders," "The Purple-flowered Androcerae of Mexico and the Southern United States" and "Descriptions of Mexican Phanerogams"). It is worthy of notice that all descriptions and keys, whether generic or specific, are given in Latin, in accordance with Article 39 of the Vienna Code. The second contribution is John R. Johnston's

"Flora of the Islands of Margarita and Coche, Venezuela," and consists of a general discussion of the vegetation, and controlling physical factors, an annotated catalogue of species, lists of the economic plants, distribution, and composition, etc. The paper, which covers about 150 pages, is accompanied by two maps of the islands, and six plates illustrating the vegetation or structural details of the plants.

E. L. Greene resumes the printing of his "Leaflets" (Vol. II., 1-24, February, 1909) by the publication of four papers—"New Species of the Genus *Mimulus*," "New Western Asteraceae," "New Composites from Oregon, Washington and Idaho" and "New Plants from Arizona."

Here may be noticed Rosendahl and Butters's "Guide to the Ferns and Fern Allies of Minnesota" intended to enable students to identify the sixty species of these plants found in the state. This is accomplished by means of keys, plates and text figures, all of which are excellent.

"The Forests of Mindoro," by M. L. Merritt, of the Philippine Bureau of Forestry, is a fifty-page pamphlet of much interest to both foresters and botanists. It is intended to give some idea of the country, the distribution and the composition of the forest areas of the island of Mindoro. This island lies about a hundred miles southwest of Manila, and contains a little less than four thousand square miles. A mountain chain extends its whole length, rising at one point to 8,500 feet, and this is bordered with foothills and broad alluvial coastal plains. Nearly two thirds of this area is covered with forests, the remainder is nearly all uncultivated grass lands, only about one per cent. being under cultivation. The report, which is illustrated by ten half-tone plates, and a map, closes with a "list of tree species collected in Mindoro and smaller adjacent islands," numbering 560 species. When we remember that these occur upon an area equal to about half a dozen counties the richness of the forest flora may be appreciated.

C. B. Robinson's "Philippine Chloranthaceae" and "Philippine Phyllanthinae" (*Phil. Jour. Science*, April, 1909) includes a sys-

tematic treatment of the genera and species of these two groups, the first with but two genera and three species, the second with seven genera and fifty-four species.

Here should be noticed the recent "Heften" (3, 4, 5, seventh series) of Karsten and Schenck's "Vegetationsbilder." The first of these by Otto Feucht illustrates the Black Forest; the second, by L. Adamovic, deals with Dalmatian vegetation, and the third, by Felix Rosen, illustrates the characteristic plants of the Abyssinian highlands. The plates maintain the extraordinarily high degree of perfection which has characterized the previous numbers, and the text is all that could be desired. How the German publisher (Fischer) can afford to publish these Heften for the low price of four Marks each is a source of wonder to American botanists.

RECENT PAPERS ON ALGAE

PROFESSOR GRIGGS's paper "Juvenile Kelps and the Recapitulation Theory" (*Am. Nat.*, January and February, 1909) takes up a profitable line of inquiry as to the young stages of many of the large brown sea-weeds, giving especial attention to *Renfrewia*, *Lessoniopsis*, *Egregia* and *Hedophyllum*. He reaches the conclusion, contrary to that of many zoologists, "that though organisms are subject to adaptation at any stage of their life cycles and may gradually cut out superfluous stages, yet, except as some such tendency has operated to change the heritage, the development of the individual does recapitulate the history of the race."

Dr. M. A. Howe's "Phycological Studies—IV." (*Bull. Torr. Bot. Club*, February, 1909) is devoted to a monograph of *Neomeris* (of which there are now known six species); two West Indian species of *Acetabulum*; a new species of *Halimeda* (from the Bahama Islands), and several species of *Udotea*, accompanied with six helpful plates.

Wittrockiella is the very pretty generic name given by the well-known Norwegian algologist, Wille (*Nyt Mag. of Nature*, Cd. 47), to a small, fresh-water chlorophyll-green alga which occurs in the brackish waters of

southern Norway in company with *Rivularia*, *Microcoleus* and other *Myxophyceae*. It is related to *Trentopholia*, and has been made the type of a new family, *Wittrockiellaceae*, of the order *Chaetophorales*.

Other papers on algae are Otto Müller's "Ortsbewegung der Bacillariaceen," VI. and VII.; A. Scherffel's "Asterococcus," and "Schizochlamys" and N. Wille's "Oocystis," in recent numbers of the *Berichte d. Deutschen, Bot. Gesellschaft*.

A HANDFUL OF FUNGUS AND PATHOLOGICAL PAPERS

ONE of the best-printed bulletins on fungi that has come to notice is Dr. N. A. Cobb's "Fungus Maladies of the Sugar Cane," issued by the Experiment Station of the Hawaiian Sugar Planters Association (Bull. No. 6, of Division of Pathology and Physiology). The paper, printing and illustrations are remarkably fine. The text will prove interesting to most botanists, especially those who have not followed strictly the latest developments in plant pathology. Thus the stinkhorns (Phallaceae) are shown to be associated with a root disease of the sugar cane, and species of *Ithyphallus*, *Dictyophora* and *Clathrus* are described as pretty certainly responsible for the injury. Other diseases of the cane, as "tip wither," "ring spot," "eye spot," "rind disease," etc., are described and remedies suggested. With this portion of the text there are seven elegant colored plates. The closing chapter is devoted to "timber rots," and here the text illustrations are unusually fine.

From the Bureau of Plant Industry of the United States Department of Agriculture we have a bulletin on "The Control of Black-rot of the Grape," by Messrs. Shear, Miles and Hawkins, in which the conclusion is reached that proper spraying with Bordeaux mixture is effective in preventing the disease. Other papers from the bureau are J. R. Johnston's "Bud-rot of the Coconut Palm" (thought to be due to bacteria); Perley Spaulding's "European Currant Rust on the White Pine in America" (a recent importation); the same author's "Present Status of the White Pine Blights" (a very useful summary of what is known of this "complex of several different

diseases"); and Metcalf and Collins's "Present Status of the Chestnut Bark Disease" (due to *Diaporthe parasitica*, which thus far has baffled all attempts at control, by anything less than the destruction of the diseased trees).

In Dr. Clinton's "Report of the Station Botanist" (Conn. Agric. Expt. Station, 1908) he takes a more hopeful view of the future of the chestnut bark disease, believing that the trouble is largely due to "winter injury" rather than to the fungus above named, and that it "is now probably about at the height of its development, so that not much additional harm may be expected." Another paper in the same report takes up another puzzling disease, peach yellows—and here, also, a suggestion is made as to its nature which at least has the merit of some probability. The closing paper gives the results of artificial cultures of *Phytophthora* of different species. This will be most useful to mycologists who may wish to introduce this method of study in their laboratories.

Other papers which may be mentioned here are Professor DeLoach's "Studies on the *Colletotrichum gossypii*" (Bull. 85, Georgia Expt. Station); W. T. Horne's "Report of the Department of Vegetable Pathology" in the report of the Estacion Central Agronomica of Cuba (1905–09), and an earlier one by the same author devoted to coconut diseases (Bull. 15); Freeman and Johnson's "Loose Smuts of Barley and Wheat" (Bull. 152, Bureau of Plant Industry); C. W. Edgerton's "Perfect Stage of the Cotton Anthracnose" (*Mycologia*, May, 1909); the same author's "Anthracnose or Pod Spot of Beans" (Bull. 116, La. Expt. Sta.); J. G. Grossenbacher's "Mycosphaerella Wilt of Melons" (Tech. Bull. 9, N. Y. Expt. Sta.); and G. W. Wilson's "Notes on Peronosporales for 1907" (Bull. Upper Iowa University, XI., 3).

We have space for only brief mention of the following, also: Century XXIX. of "Fungi Columbiani" (Elam Bartholomew, Stockton, Kans.) devoted wholly to fungi collected in Arkansas; Fawcett's "Fungi Parasitic upon *Aleyrodes citri*" (Special Studies, 1; Univ. Florida), with six plates; Rorer's "Bacterial Disease of the Peach" (*Mycologia*, January,

1909); Edwards and Barlow's "Legume Bacteria" (Bull. 169, Ontario Agric. Coll.).

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SPECIAL ARTICLES

THE CONSERVATION OF MASS AND THE PASSING OF MATTER

TO THE EDITOR OF SCIENCE: The article by Professor Lewis in the *Technology Quarterly*, discussed in your issue of April 23, 1909, by Professor Speyers, is one answer to the obvious necessity for an enlargement and restatement of some of the fundamental concepts of physics.

The discovery of radioactivity by M. Henri Becquerel, and that of polonium by Mme. Curie, initiating us into the knowledge of a new order of phenomena, together with the observation by P. Curie and Laborde of a continual production of heat by radium, and the splendid experiment of Kaufmann on the variation of mass with velocity, finally the suggestion by Rutherford and Soddy that the atoms of the radio-elements disintegrate with production of helium, confirmed in the face of great difficulties by Sir William Ramsay and Mr. Soddy, have placed before us an array of new facts for which new doctrines are imperatively needed.

We may recall that the investigations of Larmor, J. J. Thomson, Hicks and others, exhibit to us a conception of an atom as a world in miniature, where internal revolutions and reactions of distinct internal entities at enormous speeds give a basis for the discussion of latent energies implied by the physical fact of the inertia of the atom.

That the mass of a body is nothing but the energy of its ethereal rotation is a view which I have held tentatively. Following the equations used by Professor Lewis, and introducing this further premise, let M = momentum, $M' = Mr$ = angular momentum, or "moment of momentum," of the ether, where r is the radius of gyration of the reciprocating rotations of the ether. The complex of these integrated rotations constitutes an electromagnetic wave whose amplitude diminishes with r as the spherical wave-front expands. Let